「みらい」北極航海 MR14-05 における西部北極海での海洋混合層の発達過程

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Temporal evolution of surface mixed layer in the western Arctic Ocean during RV Mirai Arctic cruise MR14-05

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In recent years, sea ice extent in the Arctic Ocean has been reduced due to the global warming. During RV Mirai Arctic cruise MR14-05, we carried out a fixed-point observation including meteorological and oceanographic measurements for three weeks, September 6 to 25, 2014, in the Northwind Abyssal Plain. Previously, development of surface mixed layer (SML) during the ice-free period has not yet been fully investigated. Thus, the SML evolution was examined using shipboard meteorological observation hydrographic and oceanic microstructure measurements.

In addition, we deployed autonomous drifting instruments, UpTempO, to measure the upper layer temperature. UpTempOs allow us to estimate the SML heat content, temporal and spatial changes in the SML depth. During the first week of FPO September 6-8, high wind forcing, resulted from atmospheric front passing over the station, deepened the SML. In the middle of September 15-22, surface winds were strong again because the station was located in the rim of the Beaufort high. During this period, turbulent kinetic energy recorded in the SML certainly increased, but the SML depth was relatively persist. However during the second week of FPO September 9-15, the SML was substantially deepened despite the relatively low wind speed. We suspect that an anticyclonic eddy passed the FPO station contributed to the deepening in the SML.

Furthermore, in order to clarify sea ice formation associated with the SML processes, we are now attempting to numerically simulate the one-dimensional process in the SML, using the Local Turbulence Model (McPhee, 2008) and the FPO data as boundary and initial conditions.